Title: DIAGNOSIS SYSTEM OF EXHAUST AFTERTREATMENT APPARATUS FOR INTERNAL COMBUSTION ENGINE
Inventor(s): Takashi SHIRAKAWA et al.
DOCKET NO.: 023971-0394

FIG.1

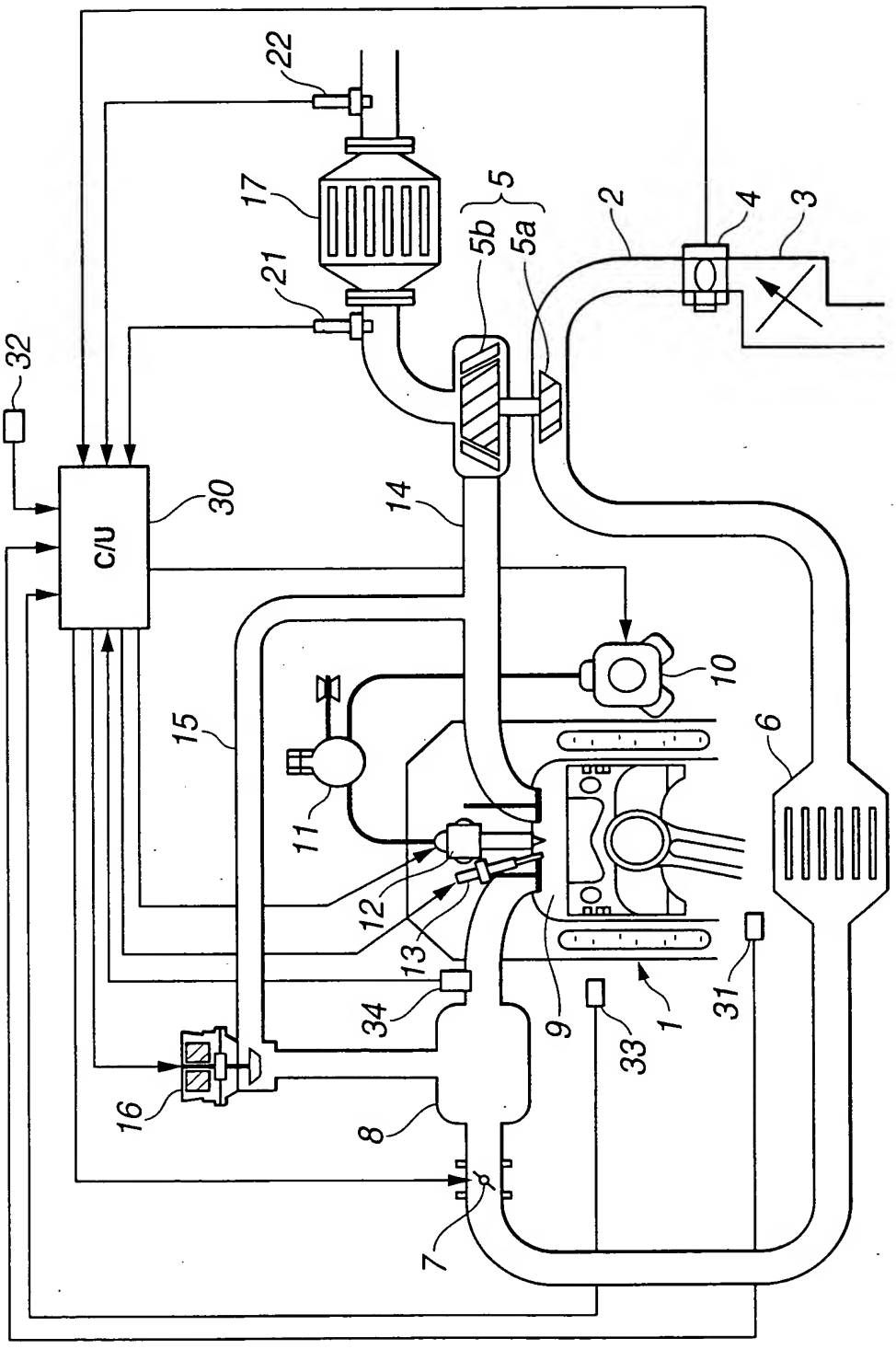


FIG.2

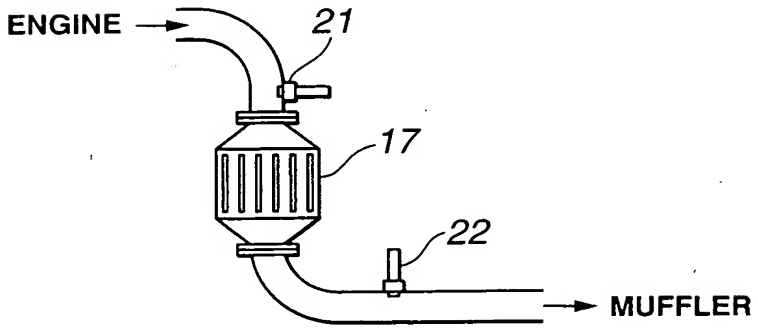


FIG.3

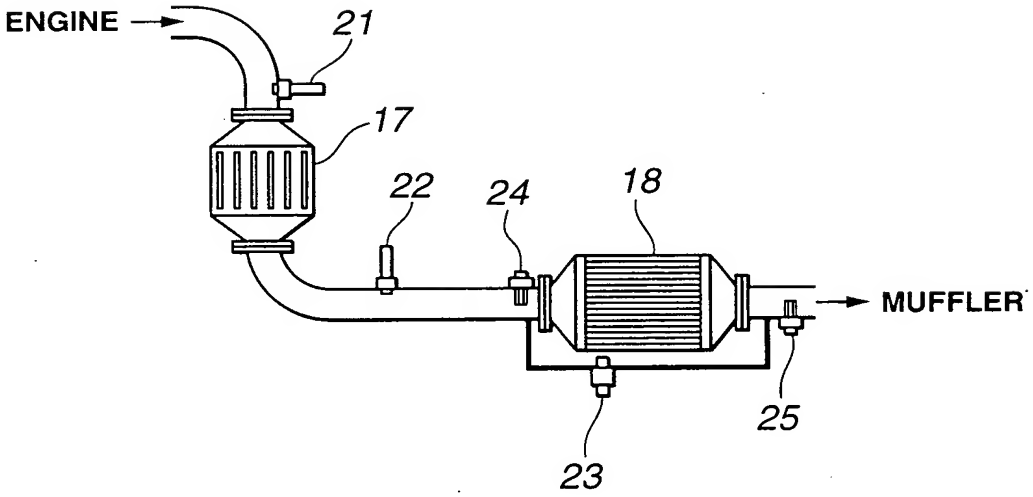


FIG.4

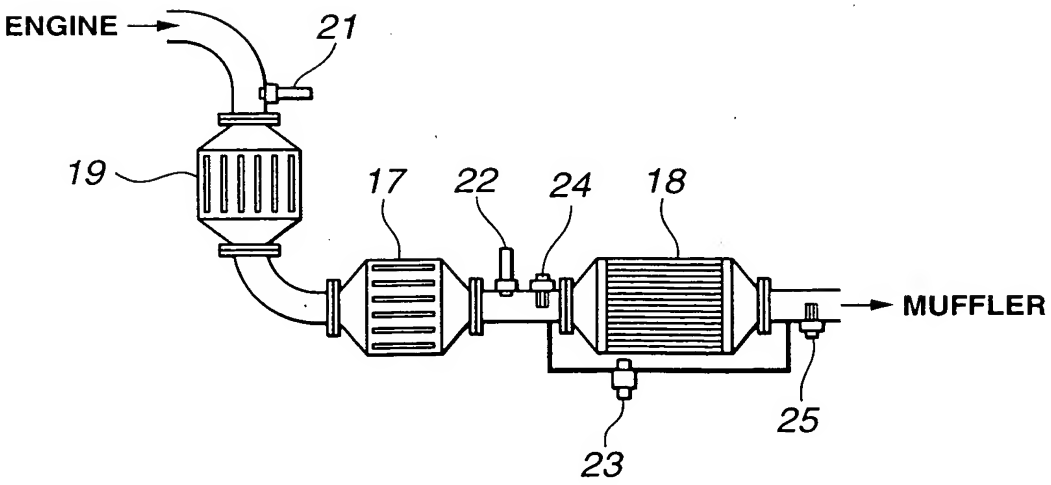
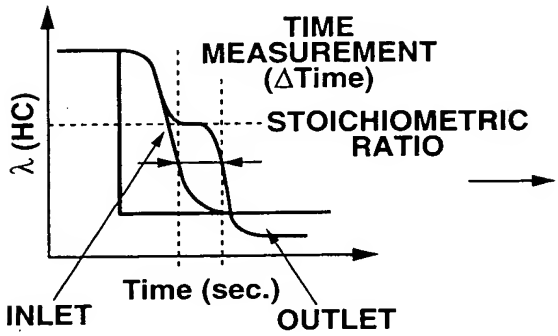
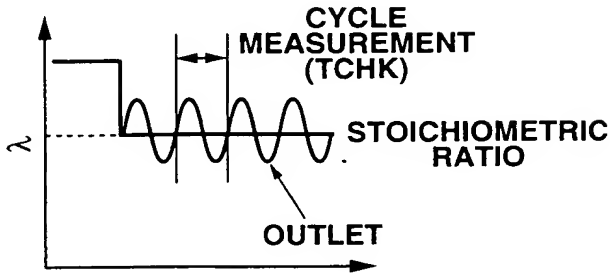


FIG.5A



(FIRST DIAGNOSIS)

FIG.5B



(SECOND DIAGNOSIS)

FIG.6

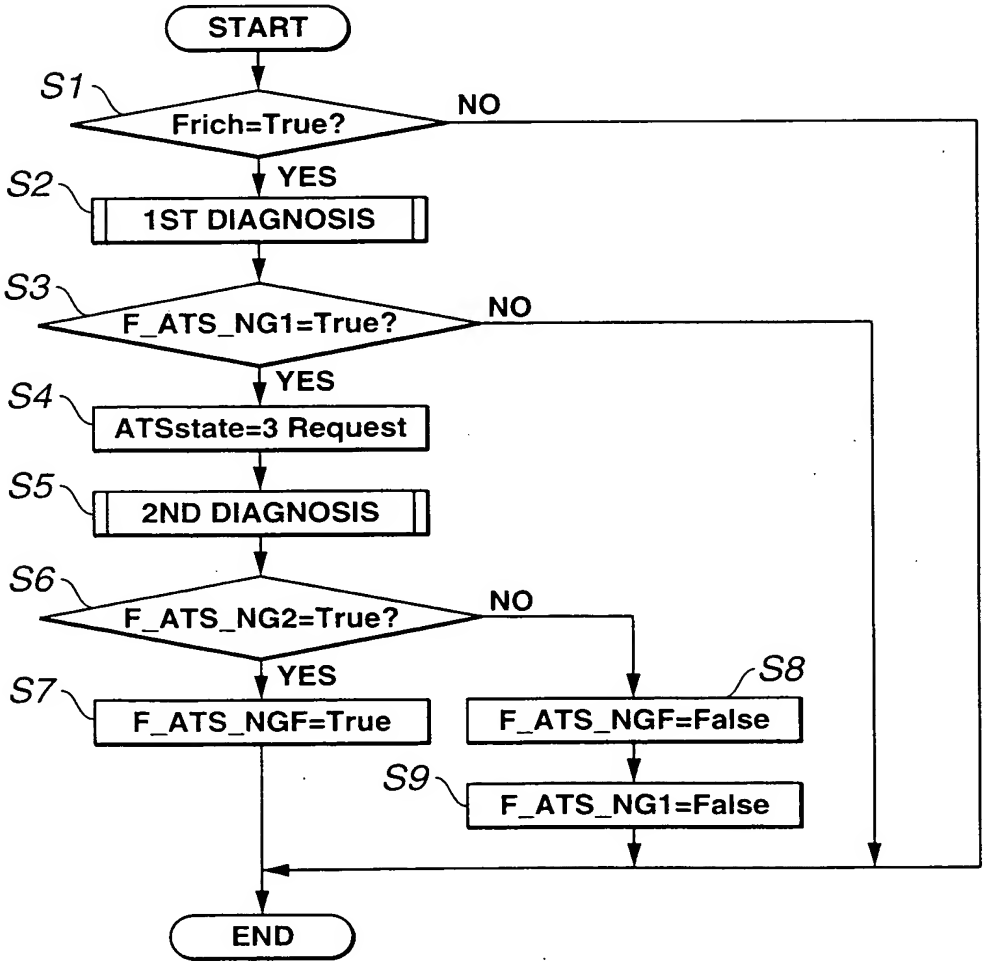


FIG.7

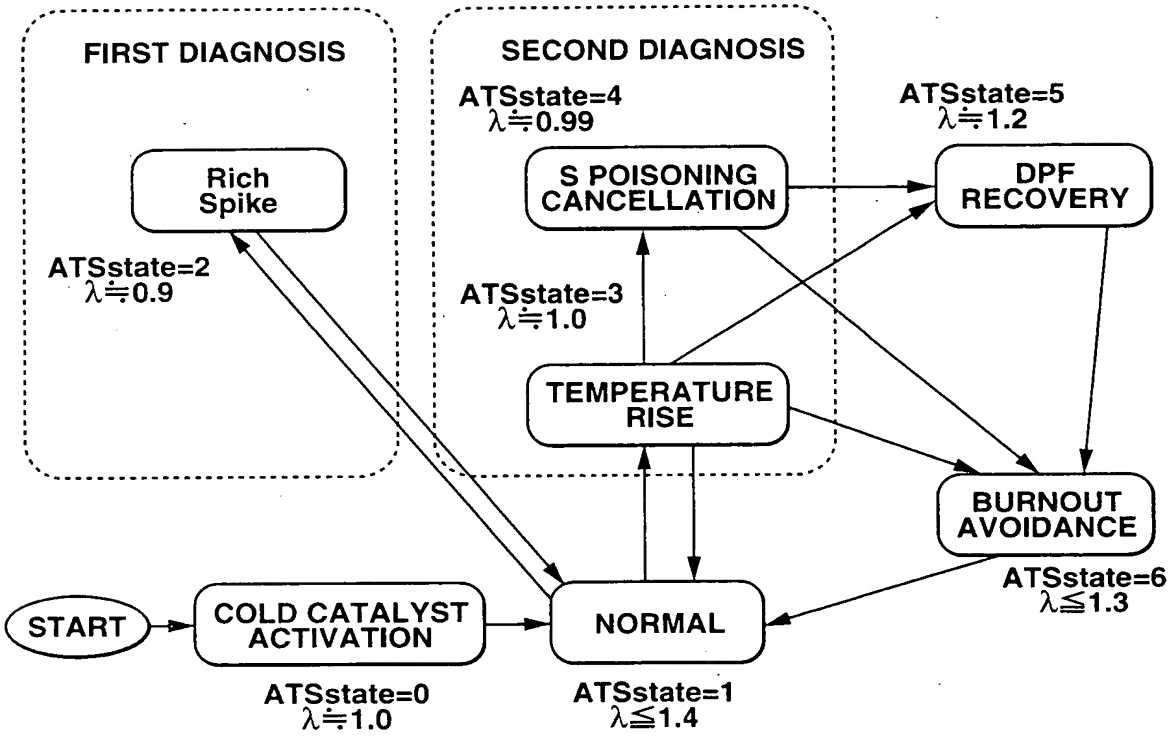

FIRST DIAGNOSIS
SECOND DIAGNOSIS
ATSstate=4
λ≒0.99
ATSstate=5
λ≒1.2
Rich Spike
S POISONING CANCELLATION
DPF RECOVERY
ATSstate=2
λ≒0.9
ATSstate=3
λ≒1.0
TEMPERATURE RISE
BURNOUT AVOIDANCE
ATSstate=6
λ≦1.3
START
COLD CATALYST ACTIVATION
NORMAL
ATSstate=0
λ≒1.0
ATSstate=1
λ≦1.4

FIG.8

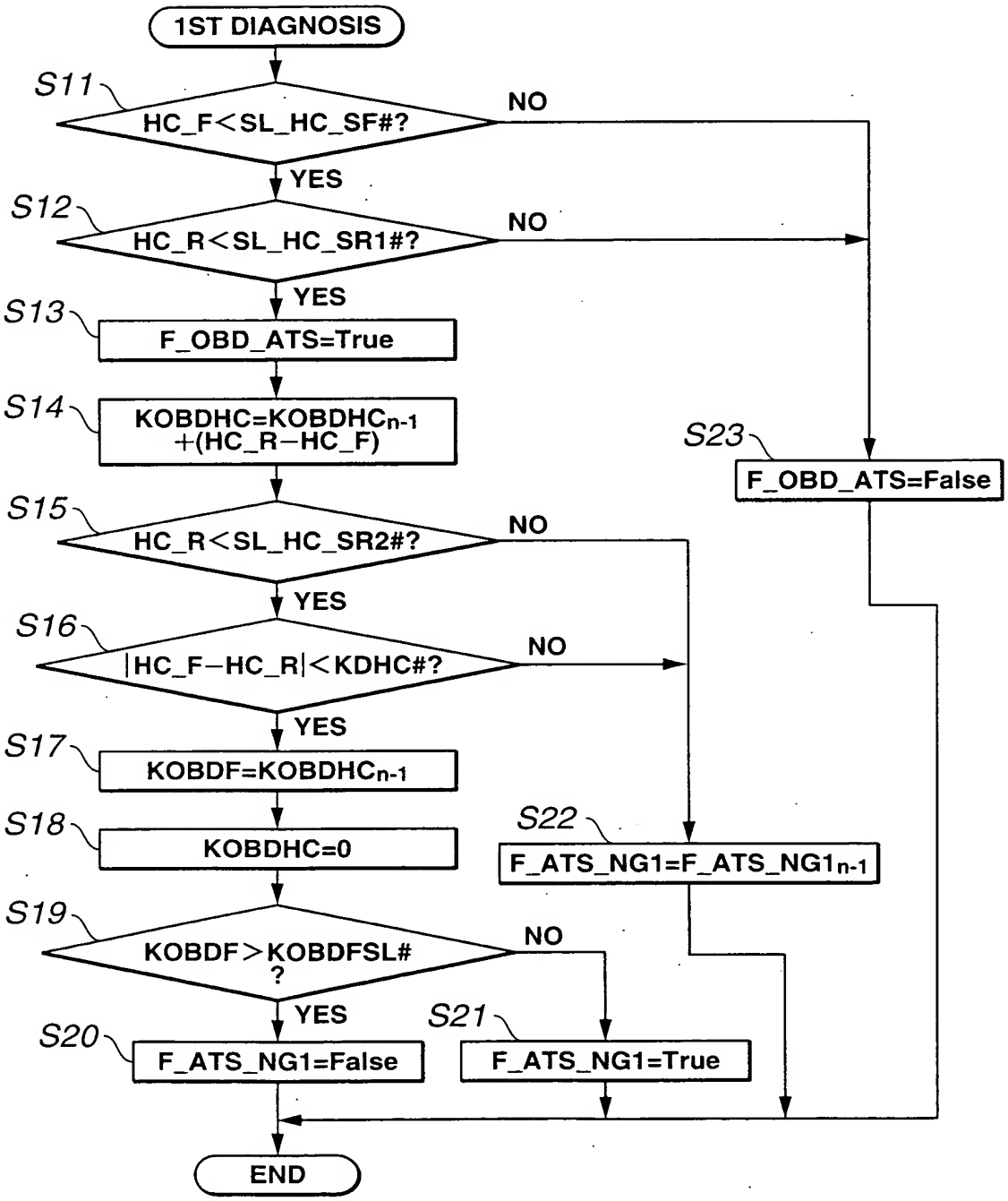

1ST DIAGNOSIS
S11
HC_F<SL_HC_SF#?
NO
YES
S12
HC_R<SL_HC_SR1#?
NO
YES
S13
F_OBD_ATS=True
S14
KOBDHC=KOBDHCn-1
+(HC_R−HC_F)
S15
HC_R<SL_HC_SR2#?
NO
YES
S16
|HC_F−HC_R|<KDHC#?
NO
YES
S17
KOBDF=KOBDHCn-1
S18
KOBDHC=0
S19
KOBDF>KOBDFSL#
?
NO
YES
S20
F_ATS_NG1=False
S21
F_ATS_NG1=True
S22
F_ATS_NG1=F_ATS_NG1n-1
S23
F_OBD_ATS=False
END

FIG.9A

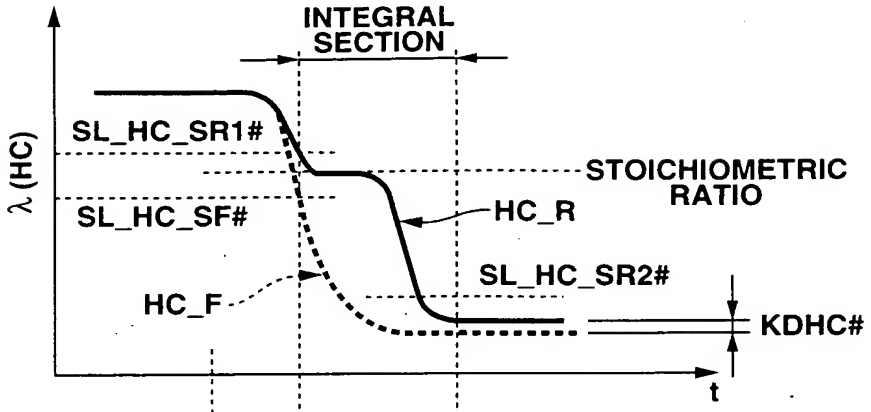


FIG.9B

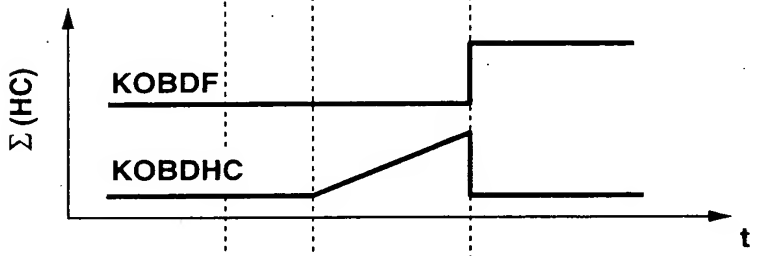
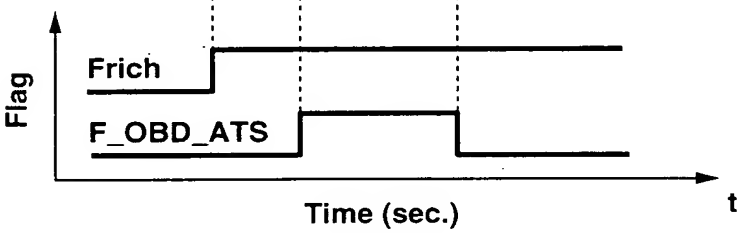


FIG.9C



Time (sec.)

FIG.10

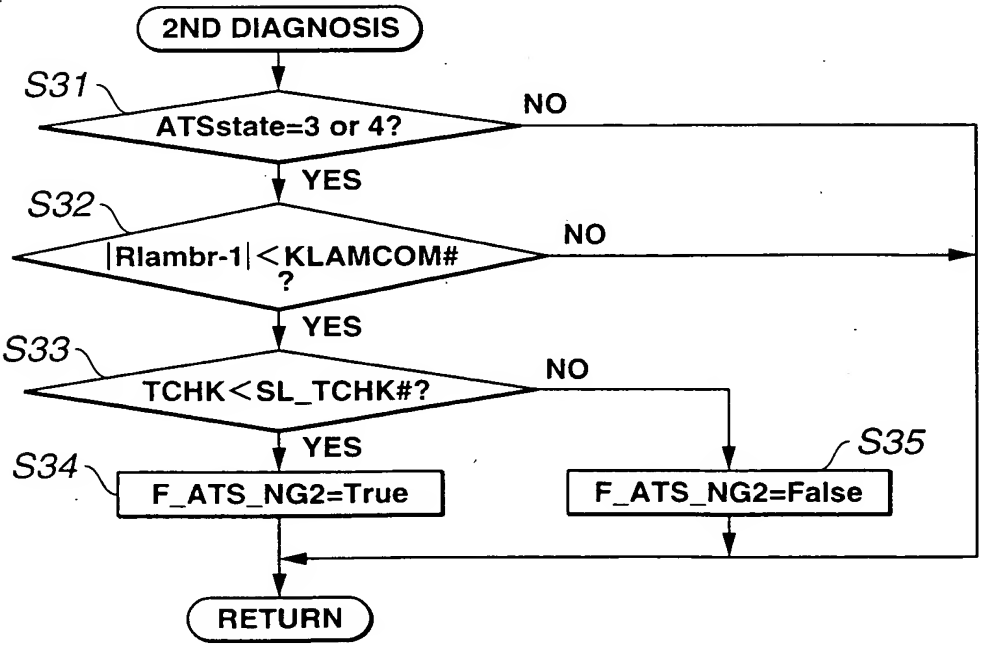


FIG.11

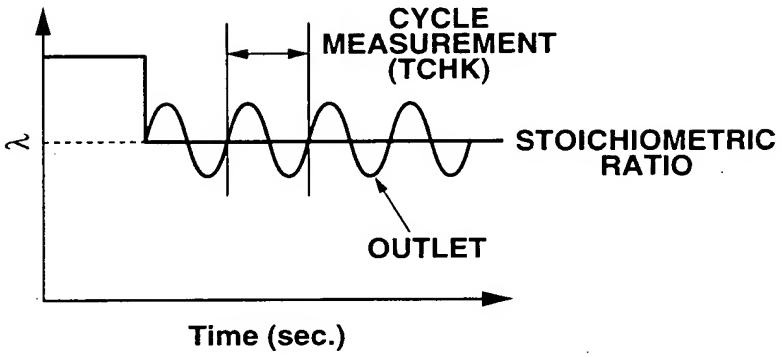

CYCLE
MEASUREMENT
(TCHK)
λ
STOICHIOMETRIC
RATIO
OUTLET
Time (sec.)

FIG.12

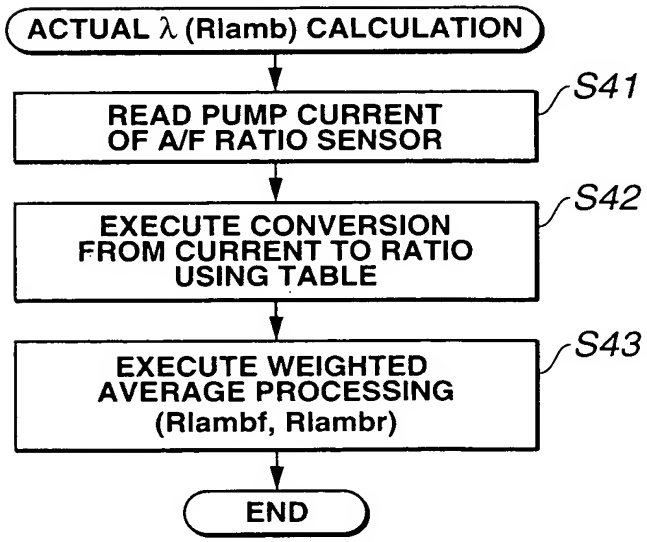

ACTUAL λ (Rlamb) CALCULATION
READ PUMP CURRENT
OF A/F RATIO SENSOR
S41
EXECUTE CONVERSION
FROM CURRENT TO RATIO
USING TABLE
S42
EXECUTE WEIGHTED
AVERAGE PROCESSING
(Rlambf, Rlambr)
S43
END

FIG.13

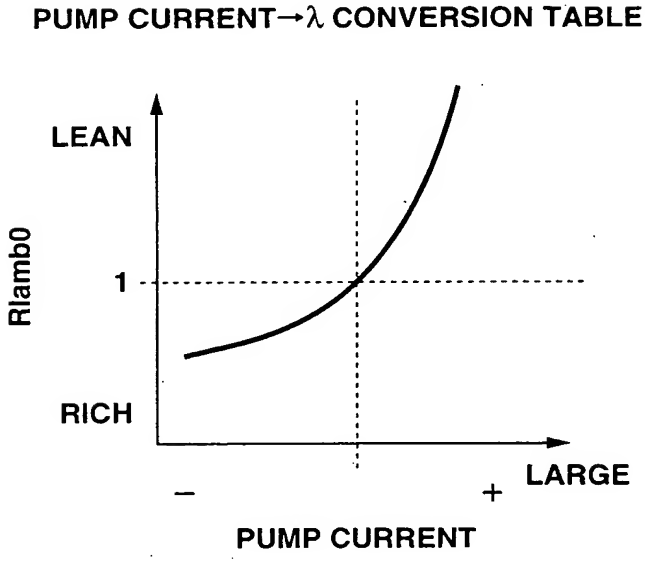

PUMP CURRENT→λ CONVERSION TABLE
LEAN
Rlamb0
1
RICH
LARGE
−
+
PUMP CURRENT

FIG.14

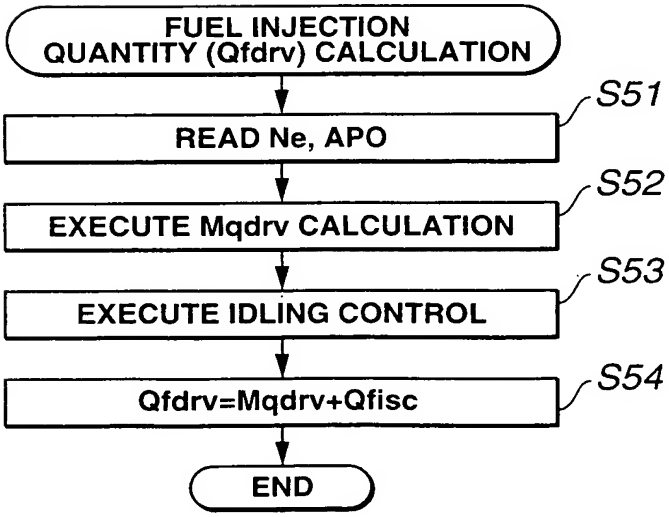

FUEL INJECTION QUANTITY (Qfdrv) CALCULATION
S51
READ Ne, APO
S52
EXECUTE Mqdrv CALCULATION
S53
EXECUTE IDLING CONTROL
S54
Qfdrv=Mqdrv+Qfisc
END

FIG.15

FUEL INJECTION CHARACTERISTIC MAP

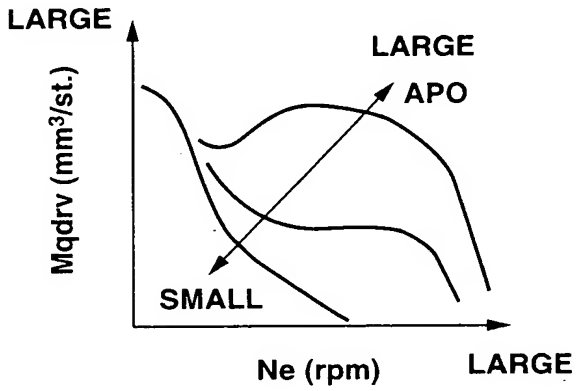


FIG.16

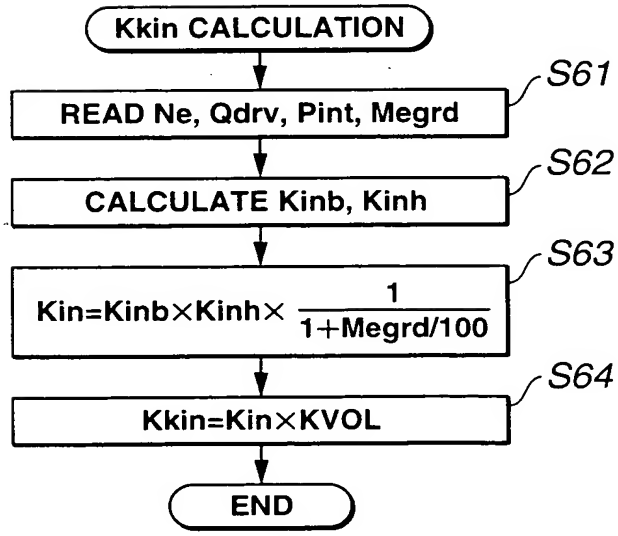


FIG.17

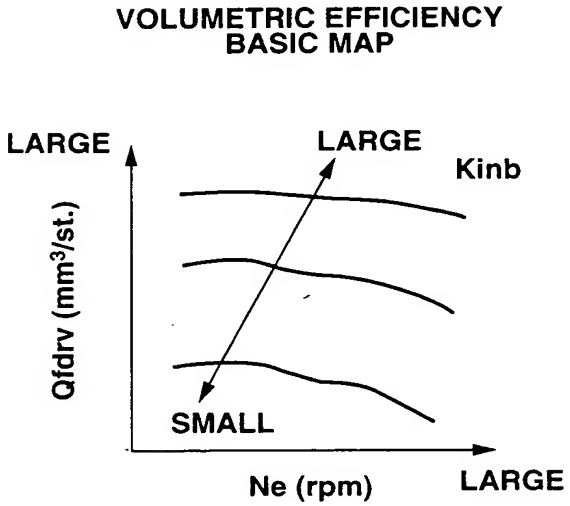

VOLUMETRIC EFFICIENCY
BASIC MAP
LARGE
LARGE
Kinb
Qfdrv (mm3/st.)
SMALL
Ne (rpm)
LARGE

FIG.18

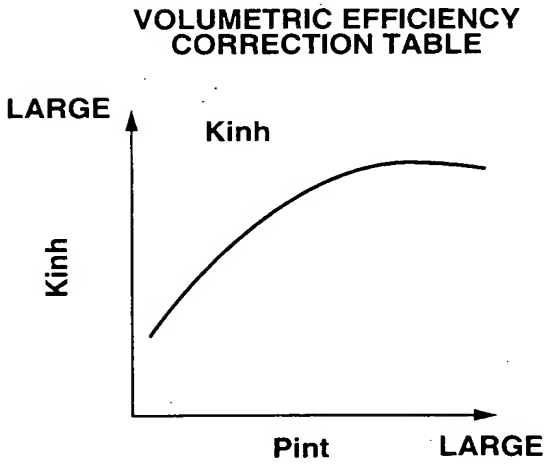

VOLUMETRIC EFFICIENCY
CORRECTION TABLE
LARGE
Kinh
Kinh
Pint
LARGE

FIG.19

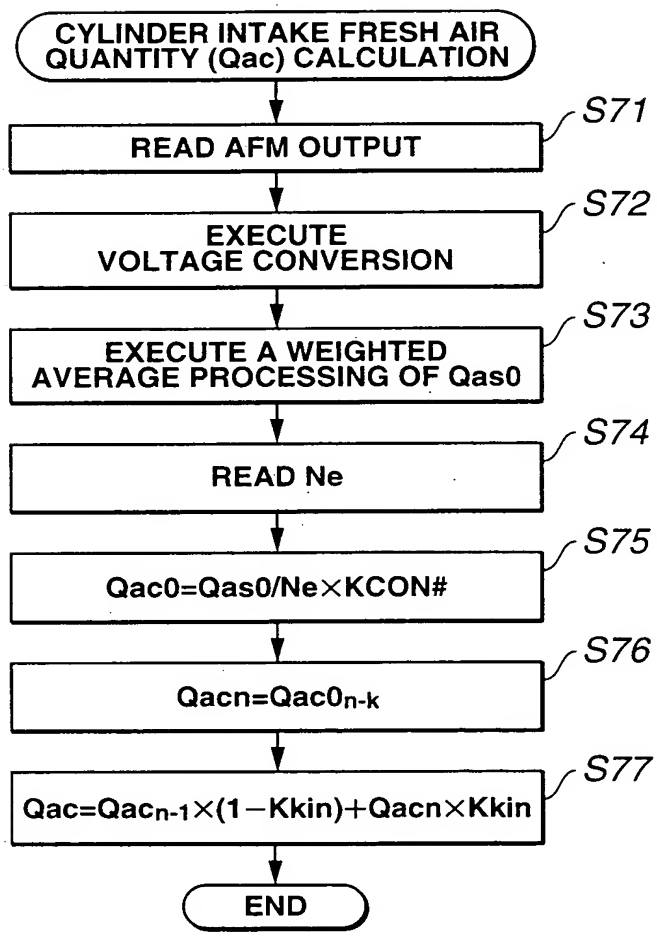

CYLINDER INTAKE FRESH AIR QUANTITY (Qac) CALCULATION
READ AFM OUTPUT
S71
EXECUTE VOLTAGE CONVERSION
S72
EXECUTE A WEIGHTED AVERAGE PROCESSING OF Qas0
S73
READ Ne
S74
Qac0=Qas0/Ne×KCON#
S75
Qacn=Qac0n-k
S76
Qac=Qacn-1×(1−Kkin)+Qacn×Kkin
S77
END

FIG.20

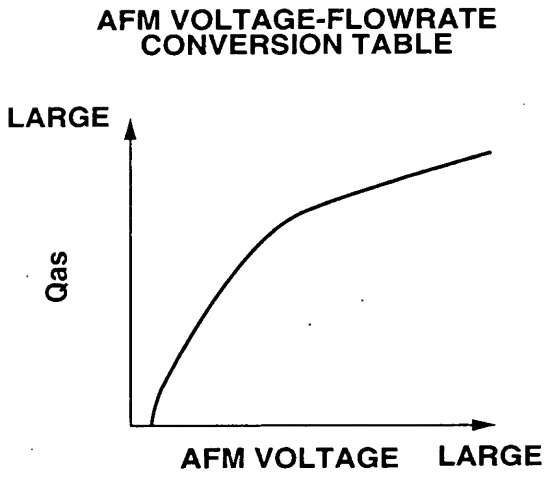

AFM VOLTAGE-FLOWRATE CONVERSION TABLE
LARGE
Qas
AFM VOLTAGE
LARGE

FIG.21

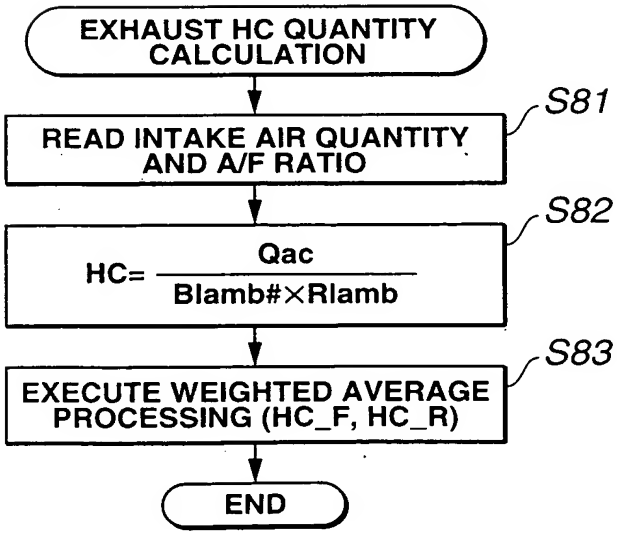

EXHAUST HC QUANTITY CALCULATION
S81
READ INTAKE AIR QUANTITY AND A/F RATIO
S82
HC= Qac / Blamb#×Rlamb
S83
EXECUTE WEIGHTED AVERAGE PROCESSING (HC_F, HC_R)
END

FIG.22A

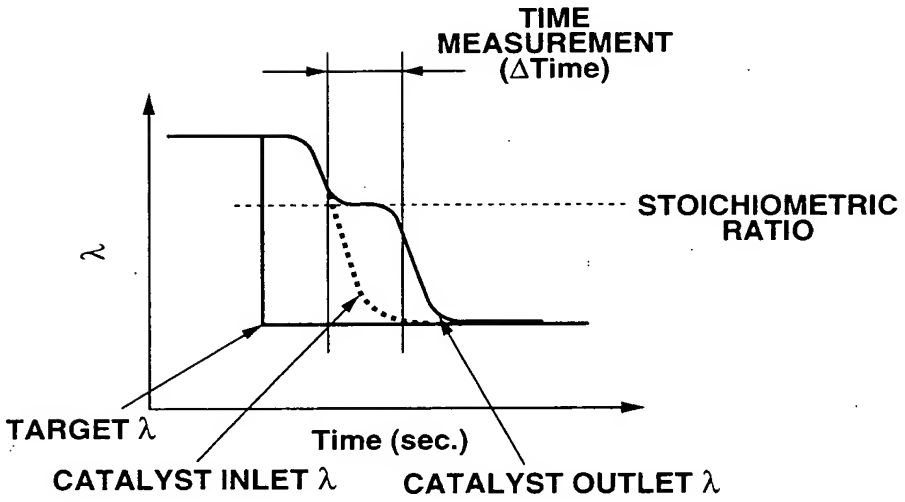


FIG.22B

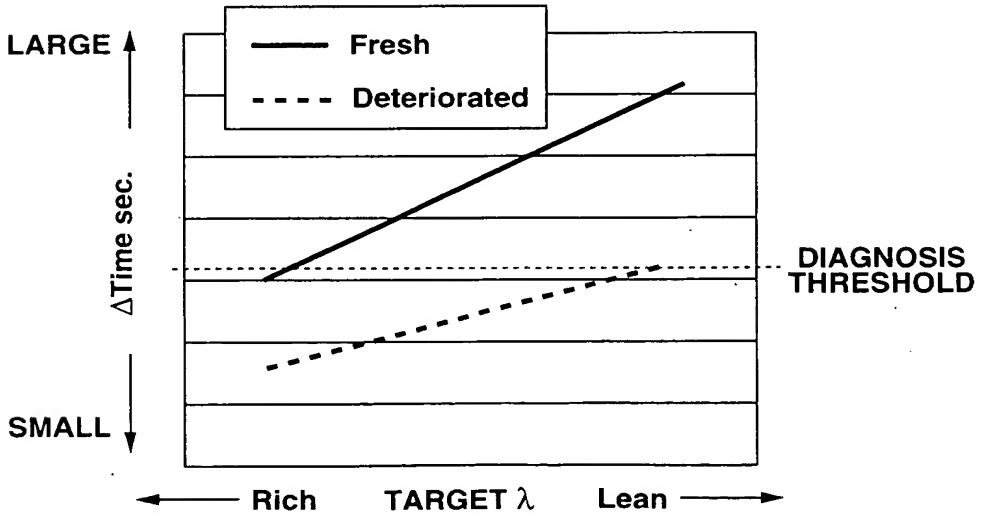


FIG.23A

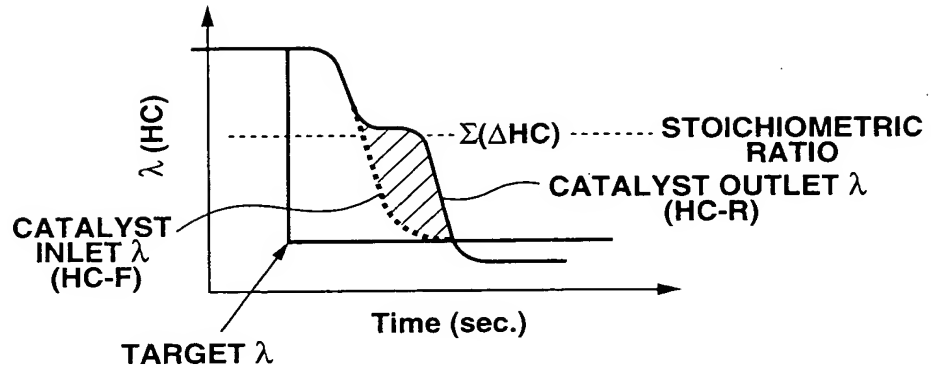
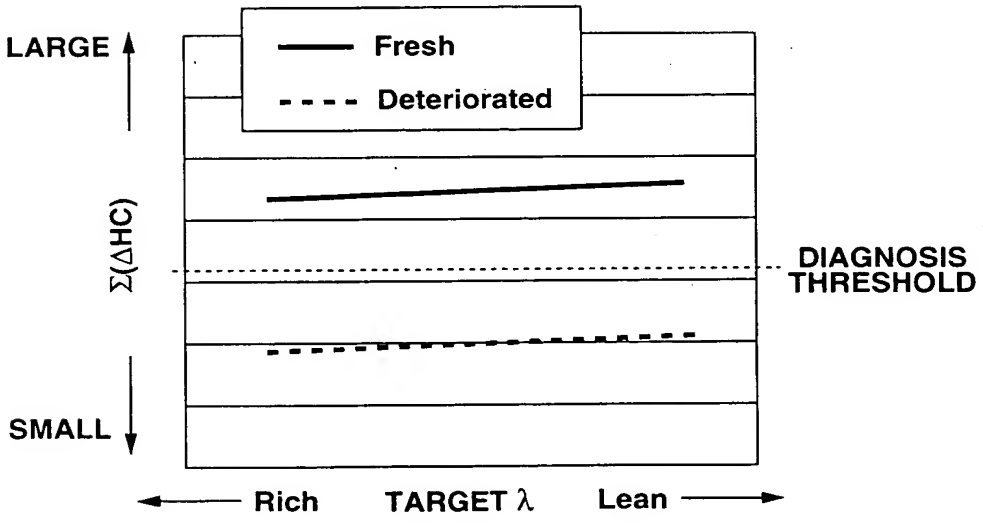



FIG.23B